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PENNSYLVANIA UNIV PHILADELPHIA
INTRAVASCULAR AND EXTRAVASCULAR HEMOLYSIS. (U)
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FINAL SCIENTIFIC REPORT ON

INTRAVASCULAR AND EXTRAVASCULAR HEMOLYSIS.

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Ronald F. Coburn M.D.

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U.S. Army Medical Research and Development
Command, Washington, D.S. 20315

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Contract No. DADA-17-69-C-9113

University of Pennsylvania, Philadelphia,
Pennsylvania 19174

Term of Contract April 1968 - Sept [redacted] 1970

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INTRODUCTION

The aim of these experiments was to determine variables that cause and modify intravascular and extravascular mechanical hemolysis. We developed a method ~~of~~ measuring intravascular and extravascular hemolysis simultaneously and applied this method to the study of relative thresholds for mechanical intravascular and extravascular hemolysis. We also started to develop a method ~~for~~ ^{was being} of studying effect of shear, using a shear device developed by from General Electric, on intravascular and on extravascular hemolysis. We were in the initial stages of testing this equipment when the contract was terminated. Two publications resulted from this contract.

PUBLISHED PAPERS

1. Mechanically induced intravascular and extravascular hemolysis in Dogs. H.W. Wallace, R.F. Coburn. -Circulation Res.: 226: 346-360, 1970. In this study we developed the method of simultaneously measuring extravascular and intravascular hemolysis. Total rate of hemoglobin catabolism is determined with measurements of endogenous CO production and intravascular hemolysis by determining rate of formation of intravascular plasma hemoglobin. Extravascular hemolysis, in our preparation, caused an average of 72.9% of the total quantity of erythrocytes destroyed during pumping of blood in an extracorporeal circuit.

2. Relative thresholds for acute intravascular and extravascular mechanical hemolysis. H.W. Wallace and R.F. Coburn. J. of

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Thoracic and Cardiovascular Surgery, 68:792-796, 1974. We tested the postulate that acute extravascular hemolysis and intravascular hemolysis occurring during and after in vivo pumping of blood in an extracorporeal circuit are manifestations of the same insult to the red blood cell in experiments designed to determine if the threshold pumping rate in the extracorporeal circuit is the same for intravascular and extravascular hemolysis. In 10 experiments performed on dogs anesthetized with pentobarbital, blood was pumped in an extracorporeal circuit for one hour and measurements of intravascular and extravascular hemolysis were made for a total of four hours. The presence of significant intravascular hemolysis was always associated with significant extravascular hemolysis. In experiments performed at relatively low pumping rates, neither intravascular nor extravascular hemolysis was detected. Thus the date support the viewpoint that extravascular hemolysis and intravascular hemolysis are related processes and that acute extravascular mechanical hemolysis does not occur in the absence of intravascular hemolysis.

MANUSCRIPTS PUBLISHED, SUPPORTED BY THIS CONTRACT

1. Wallace, H.W. and R.F. Coburn. Mechanically induced intravascular and extravascular hemolysis in dogs. Circ. Res. 226:346-360, 1970.
2. Wallace, H.W. and R.F. Coburn. Relative thresholds for acute intravascular and extravascular mechanical hemolysis. J. of Thoracic and Cardiovascular Surg. 68:792-796, 1974.

